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Fig. 1

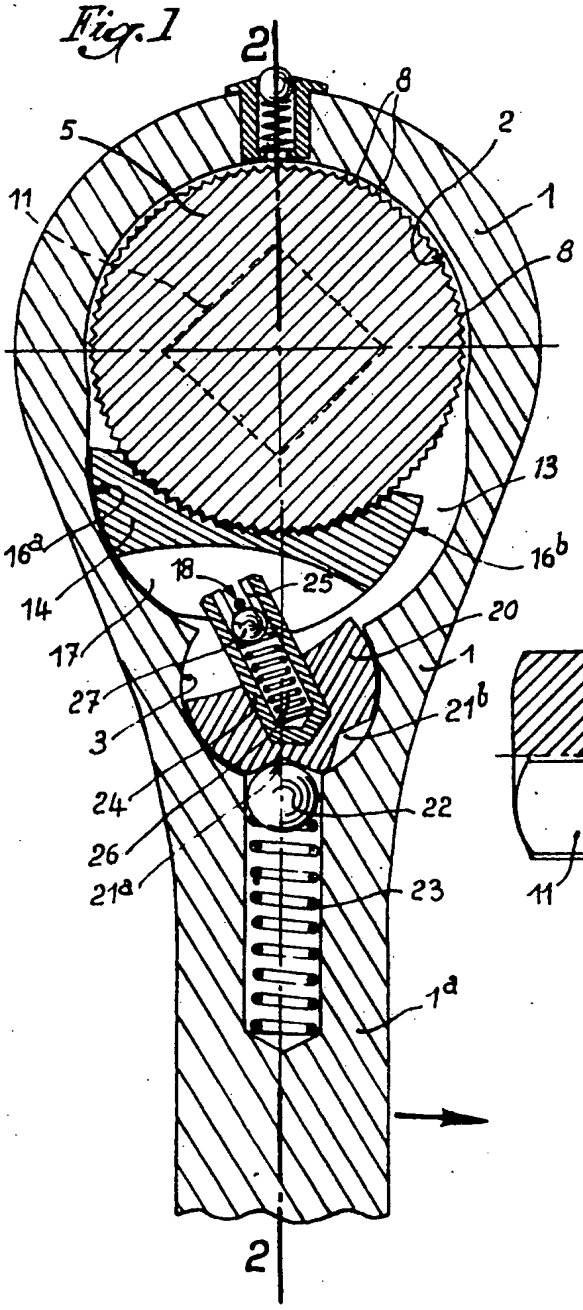


Fig. 2

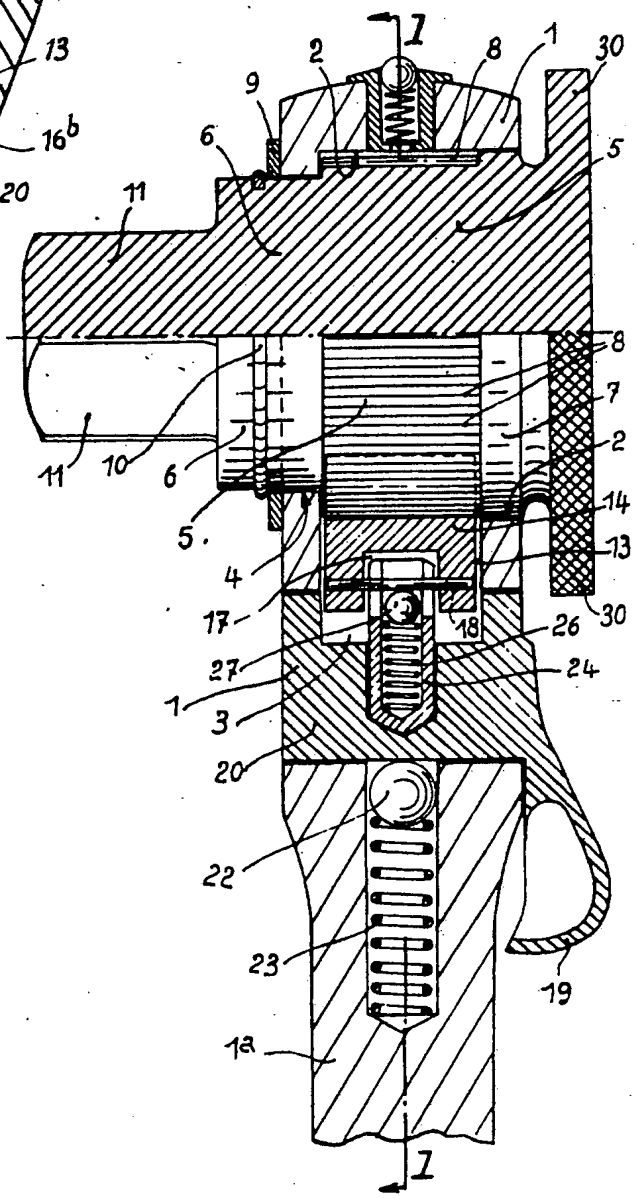


Fig. 3

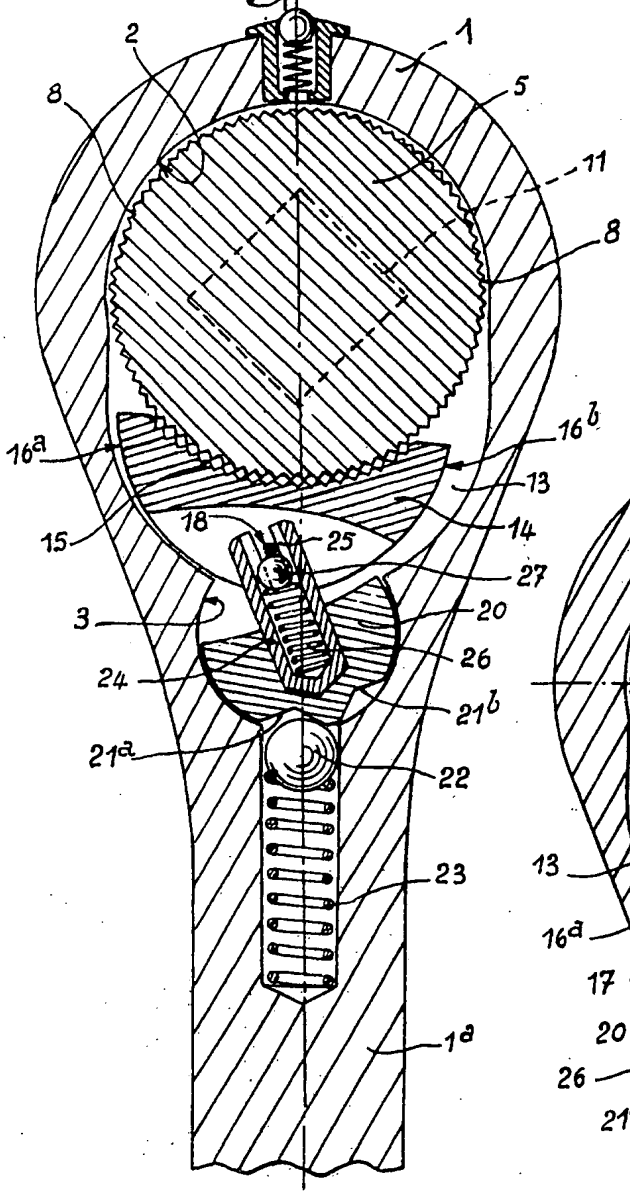
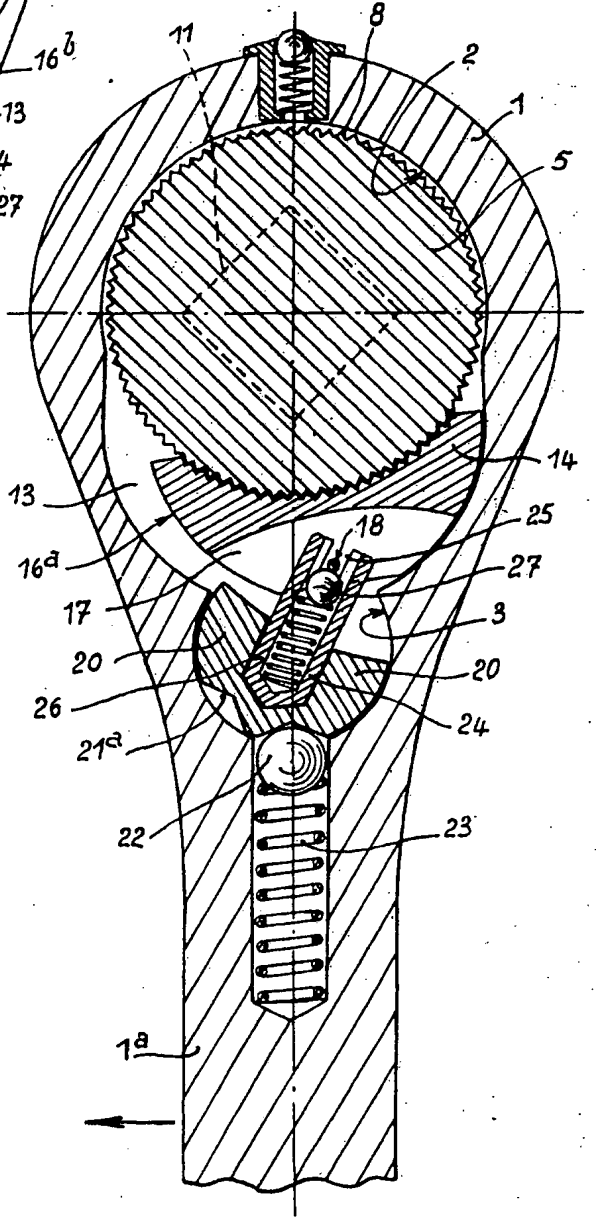

2
1
8
5
11
8
16a
16b
13
15
18
25
14
27
3
20
26
24
21b
21a
22
23
1a

Fig. 4


11
8
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21a
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1a

Ratchet-type wrench

The invention relates to ratchet-type wrenches, in which a pawl can be brought into two positions to allow using the wrenches for operating in right or left directions with a free return motion.

Such wrenches are usually used for tightening screws, bolts or other members to be rotated such that a adapter, e.g. a square, attached to the wrench is inserted into a corresponding recess at the screw and, therefore, allows a non-positive transmission of a torque.

In known embodiments of such wrenches, the toothing of the ratchet is attached to the inner periphery of the wrench housing, and the latching pawl toothed on its surface is connected to the member to be rotated which also carries the square. This rotating member shows an increased wear after a relative short using time by blunting the tooth heads so that the ratchet is sliding. In other known configurations of ratchet-type wrenches, the pawl has only one or two teeth so that a quite large movement angle is required for the wrench lever.

The object of the invention is to avoid said disadvantages of the known configurations of ratchet wrenches. This is achieved in that the toothing is attached to the outer periphery of the rotation body carrying the adapter, e.g. a square, which rotation body moves in bearings of the wrench housing which locate at both sides of the toothing. Further a crescent pawl including a toothing being attached to its inner semicircular surface and having a pitch equal to the rotation body is provided and movable within the wrench housing adjacent to the rotation body such that it can support to the housing wall over a large surface. Further, a tilting member which can be actuated from outside by a small lever acting to the tilting member is provided for switching the operation from right to left.

According to an advantageous embodiment of the invention the pawl carries a follower pin running in an axial direction and engaging a slot of the tilting member with a substantial play.

According to a further feature of the invention the tilting member is formed by a small tube which is closed to its one side and inserted in a yoke being movable within another housing hole. This yoke has two indentations which secure the both tilting positions by a spring-loaded ball.

Further, a spring can be provided in said tube which applies an elastic pressure to the follower pin of the pawl through a ball being guided in the tube.

According to a further embodiment of the invention the rotation body carrying the adapter can be provided with a narrow knurled ring at its other side outside the housing, the knurled ring going beyond the periphery of the housing and allowing a rapid screwing or detaching the screw before actually tightening or unscrewing without operating the handle of the wrench.

This handle can also serve for proper setting and inserting the nut or a bolt into the first threads with an exactly axial direction.

The knurled ring is embodied with a diameter such that a sufficient torque can be obtained during its actuation to rotate the screw at the first threads. The knurled ring is located in a good grip position for the operating hand, since it is opposite to the adapter. The knurled ring can permanently secured to the rotation body, e.g. by welding or soldering, but it is better produced integrally with the rotation body.

Further, the handle of the wrench can basically be integrally with the wrench housing, but it can also be detachably set.

The invention is explained in detail by way of the embodiment illustrated in the drawings. In the drawings:

Fig. 1 shows a cross section of the ratchet wrench taken along the plane 1-1 of fig. 2 in the clamping position for the rotating direction from left to right,

Fig. 2 shows a side cross section taken along the plane 2-2 of fig. 1 in which, however, the system for the direction reversal is positioned in the tilting position,

Fig. 3 shows the section view of fig. 1, but in the moment of back movement with a released ring gear,

Fig. 4 shows a further cross section similar to fig. 1, but for the case of the reversal of rotating direction and of the locking position for the movement from right to left.

As shown in Fig. 2, the rotation body 5 forms a common part with the left side square 11 and a knurled ring 30 protruding over the outer periphery of the receiving bearing 4 in the housing 1. With this ring 30 the square 11 can be directly rotated by hand in one or other directions according to the position of the pawl 14 without moving the handle 1a.

When operating the handle 1a for adjusting, the screw or a bolt to be tightened can be inserted into a thread in the proper axial direction and a rapid advancing can be obtained by manually actuating the knurled ring 30. The blocking can be made effectively by adjusting the handle 1a. The unblocking is caused in the same manner by a reversed handling.

The wrench substantially consists from a housing 1 elongated by the handle 1a (illustrated to be cut away in the drawing), and in which two axially parallel holes 2, 3 are located which are opened to each other. The hole 2 is restricted by a small-diameter bearing 4 at one side.

The rotation body 5 rotates within the hole 2 and has two journals 6 and 7 running in said bearing 4 and the hole 2, respectively. Between these both bearings the rotation body 5 has teeth 8 at its whole surface, the head of the teeth 8 being located in a small distance from the hole 2. The rotation body 5 protected against an axial displacement by a round disc 9 having a spring washer 10 carries the square 11 for connection with the element to be screwed.

The hole 2 is supplemented toward the handle 1a by a cavity 13 within the housing 1 in which a pawl 14 having a crescent-like profile is accommodated, the inner semicircular periphery being provided with teeth 15 locating at the same radius as the teeth of the rotation body 5.

The rounded outer surface of this pawl includes a curve at each outer side 16a and 16b, the radius of the curve corresponding to the radius of the inner wall of the cavity 13, namely where these outer zones can come in mutual contact.

The pawl 14 also includes a recess 17 which is bridged by a follower pin 18.

The axially parallel hole 3 opens following to the cavity 13, wherein a yoke 20 forming a direction switch can rotate within the hole 3 around a part of a total revolution under the influence of a small lever 19. The yoke 20 includes two indentations 21a, 21b corresponding to two rotating positions of the yoke 20 in which a latching ball 22 can penetrate into the one or other of the indentations under the action of a spring 23.

The movement transmission between the yoke 20 and the pawl 14 is obtained by a small tube 24 being inserted in the yoke 20 and including a slot 25 at its end facing the pawl 14, wherein the pin 18 engages the slot 25. A ball 27 applies an elastic pressure against this pin under the action of a spring 26.

If the pawl 14 is located in the position illustrated in fig. 1 and the housing 1 is rotated by the handle 1a in a direction of the arrow drawn in fig.1, the pawl 14 supports against the wall of the cavity 13 across its large surface 16a and, thereby, is wedged against the toothing 8. The toothing 8 transmits the rotation movement to the square 11 through the body 5.

During the back movement of the handle 1a (Fig. 3) the pawl 14 tends to rotate in the same direction. The pawl 14 is downwardly going back under compressing the spring 26, is jumping from the toothing 8, and is freely sliding opposite to the toothing 8.

To obtain the drive of the square 11 in a reverse direction (Fig. 4), it is sufficient to actuate the lever 19 such that the ball 22 engages the indentation 21b. The simultaneous movement resulting therefrom for the tube 24 causes tilting the pawl 14 through the pin 18, so that the pawl 14 now supports against the wall of the cavity 13 with its other side 16b. By the large-surface support of the pawl to the housing wall, a reliably mutual engagement of the toothings of the pawl with the rotation body and, therefore, a substantially smaller operation wear of these members than in known devices of these kind is achieved.

Claims

1. A ratchet-type wrench for tightening screws or similar rotating members, in which a toothing in each movement direction generates a non-positive connection between a drive lever and the member to be rotated, characterized in that the toothing (8) of the ratchet is attached to the outer periphery of a rotation body (5) carrying the adapter (11), which rotation body (5) moves in bearings (4) of the wrench housing (1) which locate at both sides of the toothing (8), that further a crescent pawl (14) including a toothing being attached to its inner semicircular surface and having a pitch equal to the rotation body (5) is provided and movable within the wrench housing (1) adjacent to the rotation body such that it can support to the housing wall over a large surface, and that a tilting member (20) which can be actuated from outside by a small lever (19) is used for switching the operation from right to left.

2. The wrench according to claim 1, characterized in that the pawl (14) carries a follower pin (18) running in an axial direction and engaging a slot (25) of the tilting member (20) with a substantial play.

3. The wrench according to claim 1, characterized in that the tilting member (20) includes a small tube (24) inserted in a yoke (20) with its one side being closed, the yoke (20) being movable within a further hole (3) of the housing (1) and having two indentations (21a, 21b) which secure the both tilting positions by a spring-loaded ball (22).

4. The wrench according to claim 3, characterized in that a spring (26) having a ball (27) is guided in the tube (24) being inserted in the tilting member (20) for applying an elastic pressure to the follower pin (18) of the pawl (14).

5. The wrench according to claim 1, characterized in that the rotation body (5) including the adapter (11) at its one side is provided with a narrow knurled ring (30) at its other side outside the housing, the knurled ring (30) going beyond the housing periphery and allowing a rotation of the adapter by hand.